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The Montreal, Ottawa & Georgian Bay Waterway.

Reprint of an article on the local traffic of the proposed canals, by A. J Forward, B.A., barrister, of Ottawa, which appeared in the issues of the *Canadian Engineer* for May and June, 1897 :

In Scribner's Magazine for January, 1896, a New York writer quotes approvingly the proposition of L. E. Cooley that " the line of export must follow the line of domestic transportation," and infers that " whatever merit Canadian routes may have from an engineering standpoint is entirely overbalanced by the fact that they run through a district which can furnish but very little freight in either direction," The fallacy of this statement, so far as regards the Ottawa route, may be readily shown.

During the season of 1895 the traffic of the Erie canal, both eastward and westward, originating in New York state, was in the neighbourhood of 600,000 tons, of which the following were the principal items: Pot and pearl ashes, 11,495 tons ; barley malt, 24,698 tons ; salt, 66,460 tons ; stone, lime and clay, 240,859 tons. The quantity of coal distributed was 469,595 tons. Wheat from Buffalo and Tonawanda to points along the line of the canal amounted to 71,850 tons. From 1890 to 1894, inclusive, the movement of freight was as follows, according to New York Chamber of Commerce reports :

	From Tide-Water. Tons.	From Western States. Tons.	From N.Y. State. Tons.
1890	1,304,274	1,194,017	470,549
1891	1,175,536	1,186,521	502,589
1892	1,120,704	1,329,706	478,380
1893	567,659	1,586,238	675,380
1894	960,320	1,437,293	259,059

The average annual traffic of the Erie canal originating in New York state. or, in other words, "derived from the district through which it passes," was therefore, during that period, only 473,191 tons.

For the period 1883-93, inclusive, the average traffic of the Ottawa canals amounted to 692,173 tons.* Practically the whole of this originated along the Ottawa river, and the bulk of it was lumber. In 1894, out of a total traffic in that year of 562,010 tons, no fewer than 518,747 tons were the produce of the forest** During the same year out of 886,778 tons moved on the St. Lawrence, exclusive of the Welland canal, 537,982 tons were through freight, leaving only 348,796 tons as the traffic of local origin. From these figures it appears that the lumber traffic alone of the present Ottawa canals exceeds the entire traffic of the Erie canal derived from New York state, and is double the local traffic of the St. Lawrenee canals. Such being the case when the canals extend westward no further than Ottawa city, it is reasonable to expect that the locally-derived traffic of the completed waterway, passing through the heart of the lumber country, and giving an additional outlet westward to Chicago and other lake markets, as well as better facilities to the east bound trade, will be at least twice or three times as great as that of the Erie canal, without reckoning on anything else but lumber and other products of the forest.

THE LUMBER QUESTION.

The output of sawn lumber from the Ottawa district for 1895 was estimated at 627,000,000 feet. This at 600 feet B.M. to the ton, would amount to 1,045,000 tons. In 1892, the Georgian Bay region exported 184,500,000 feet of saw-logs, or 307,500 tons. Last year 307,000,000 feet (estimated), or 511,666 tons, went to the United States from that quarter. An open waterway from the lakes to the foot of Lake Temiscamingue

*Canadian Stat. Year Book, 1894. **Report Department Railways and Canals.

would result in the establishment of mills on the route to saw lumber for export to lake markets. A largely increased cut of timber would result, and the provincial revenues be correspondingly augmented without any injurious drain on our forest resources. Henry O'Sullivan, inspector of surveys for the province of Quebec, in his report of surveys on the Upper Ottawa in 1895, says: "If there were mills on the spot, or if easy access could be had to this region, a great deal of good timber that is now left to rot could be utilized; but when we consider the distance, some seven hundred miles, that this timber has to be driven to the Quebec market, the second quality stuff cannot pay." Hardwoods, which cannot be floated for long distances, and inferior sorts of timber, would at once become merchantable and go to swell the annual output, which it may be safely asserted, might be doubled without trenching to any greater degree on the stock of pine of the better class. Where there is cheap transportation, such as the waterways would afford, the by-products of the forest are in the aggregate of greater value than the lumber and timber annually cut. Pulp and pulp-wood alone will furnish a large carrying trade. The market is extensive and rapidly growing. European countries import over 500,000 tons of pulp annually. The report of the New York forest commission, 1891, states: "In the last eight years the amount of timber used for this purpose has increased 500 per cent. In 1891 the timber cut for pulp-wood in the great forests of Northern New York was equal to one-third the amount cut by the lumbermen. Already the cry of scarcity of pulp-wood is being raised in the United States, and they must soon come to Canada for almost their entire supply. On the head waters of the Ottawa, and northward over the height of land, are inexhaustible stores of spruce and poplar of the best quality. The conditions for its local manufacture are also of the best. Three things are necessary to success, suitable wood, extensive water power, and

cheap labour. All these, as well as cheap transportation, will be found along the Ottawa river. Firewood to the extent of 1,064,812 tons was carried on Canadian railroads in 1893, and would furnish considerable traffic on the Ottawa. Tan bark, hop poles, telegraph poles, railway sleepers and ties, stave bolts, posts, pot and pearl ashes, manufactures of wood, etc., along with various minor products of the forests, would each afford a material addition to the traffic.

Without counting, however, on any increased output from any of these sources, there would be an annual traffic of 1,800,000 to 2,000,000 tons of products of the forest alone to draw from, and all "furnished by the district through which the canals run."

THE PHOSPHATE OUTPUT.

The opening of this waterway will aid to revive phosphate mining, and will eventually, by giving access to markets, and reducing the cost of transportation, swell it to an industry of very large proportions.

There are two principal districts in Canada where apatite or phosphate of lime occurs. Both these are in the Ottawa Valley. The first, on the north shore of the river, consists of a belt from 12 to 25 miles wide, stretching northward through Ottawa county. Though of limited area, extending about 30 miles, so far as exploited, it is notable for the richness of its deposits, both as to quantity and quality of product. The second district is in Ontario, having been developed principally in the counties of Leeds and Lanark, in the vicinity of the Rideau canal, and covers a larger area than that on the north side of the Ottawa. Hitherto the impression has prevailed that the deposits are smaller and of poorer quality than those in Quebec. However, the report of the Royal Commission on the Mineral Resources of Ontario states: "Larger deposits have been opened up, particularly in one district, on the Quebec side thus far, but as regards similarity of occurrence and variation in quality (dependent largely upon

intelligent dressing of the rock) identical conditions appear to prevail on both sides of the Ottawa. The quality of the higher grades of phosphate shipped from some of the mines along the Kingston and Pembroke railway is as high as any produced in Canada." The depth to which the apatite extends is probably for all practical purposes unlimited. Shafts over 600 feet deep still continue in good phosphate, and the vein matter, though irregular, is continuous. Mr. H. J. Wigglesworth, of New York, in addressing the Canadian Mining Engineers in 1895 said: These phosphates are practically unlimited. Those who have studied their occurrence most carefully see no possibility of exhausting them. If all the population of Canada were employed there mining for ten years, the extent of the deposits would not be laid bare"

MARKET FOR PHOSPHATES.

Here is evidently the basis of an extensive future industry. It is estimated that every year 1,500,000 tons of phosphate are taken out of the soil of the United States by its food crops. This must be returned to the soil in some form. For want of it many farms in the Eastern States have been abandoned as worthless, and whole States that could grow 30 bushels of wheat to the acre do not now average 15. Large areas in the older portions of Quebec and Ontario have been exhausted by continuous cropping. A judicious use of fertilizers would restore vitality to the soil. The wornout cotton lands of Georgia, by the use of artificial manures, were raised in 20 years from a value of $3 per acre to $30. The same transformation might take place in Quebec. An almost unlimited home market for this valuable product will be developed in time. If the Ottawa waterway is to carry eastward the grain of the west, there must be return cargoes for the vessels employed in the traffic. What more beneficial occupation than to convey back to the soil the fertilizing elements of which it has just been depleted by the crops exported? Chicago,

Cleveland and other lake ports will afford markets every year more extensive. The only competition in those markets would be with the South Carolina product, which is handicapped by the long and expensive railway haul across the Alleghanies and westward. Vessels by the Ottawa waterway looking for return cargoes would carry very cheaply. Buckingham, Que., would be about the same distance from Chicago by water as Buffalo.

The adverse influences affecting Canadian phosphates are chiefly: 1. Low prices in the European markets, owing to cheapness of production in South Carolina and Florida; 2. General depression of the agricultural interests and low prices for farm produce; 3. High cost of apatite mining, owing to the uncertainty of its occurrence, and the expense of selection of "cobbing;" 4. Frequent rejection of shipments that fail to analyze up to required quality; 5. Excessive cost of transportation; 6. Lack of home market.

THE EUROPEAN MARKET.

The demands of the European market have been confined to the highest obtainable grades. These are used for mixing with low grade, cheap material from South Carolina and elsewhere. The necessity of obtaining an 80 per cent. grade immensely increases the cost of production, and leaves a very large part of the product at the mines as waste material. If the United States and Canadian markets were available to the fullest extent, so that a 60 per cent. grade could be shipped, the output of each mine would be nearly doubled with the same labor, and the cost of mining and handling materially reduced. The present cost per ton laid down in the English market, ranges from $7 to $14, while it is probable that if markets on this continent were to take the low grade paoduct, it would be loaded on vessels at Buckingham at from $2.50 to $5 per ton. It may be shipped either after simply grinding the rock, or after manufacture into superphosphates. Magnificent water-power for grinding is avail-

able at the mouth of the Du Lievre. Iron pyrites for the manufacture of sulphuric acid can be conveniently obtained. To estimate the prospective tonnage to be afforded is, of course, out of the question; but there is every reason to believe it would be large eventually. About 6,000,000 tons have been shipped from the South Carolina deposits to date. European markets import 500,000 tons a year.

Another feature to be taken into account is that mica and other minerals occur very frequently associated with phosphate, where neither alone will repay working. So that whatever helps the phosphate industry will stimulate their production as well. Mica, graphite, asbestos, serpentine, pyrites, iron, and other mineral products of economic importance occur throughout the phosphate region, and would be extensively developed by the opening of this waterway.

THE MINES NEAR OTTAWA.

The principal ores of the Ottawa region are magnetic. Hematite occurs very generally associated with magnetite, but usually in small quantities comparatively. From the well-known South Crosby deposits on the Rideau lake northward to Arnprior, and extending across the river into Pontiac county, is a region described by mining experts as a hematite and magnetic belt whence valuable ores may be obtained in large quantities. Five miles from Ottawa, four miles from excellent water power on the Gatineau river, and only two miles from a shipping wharf, is the Baldwin mine. Ore from this has been pronounced "the best car wheel iron ever used." The vein has been traced upwards of one and a half miles on the surface, there being at one place a solid hill of ore 100 feet in height. The amount of exposed or easily accessible mineral has been estimated at 100,000,000 tons. Ten miles northeast of Ottawa is the Haycock mine, from which very large quantities of ore may be obtained. Thirty-five miles west of Ottawa and about four miles from the Ottawa

river, are the Bristol mines, where there is an available supply of ore calculated by their mining superintendent, Mr. Symons, at over 30,000,000 tons. A report made for the owners in 1889 by John Birkenbine, a mining engineer of Philadelphia, among other things states:

"The extent of the ore body would appear ample to encourage the installation of a plant for smelting the ore, and personal investigations impress me with the belief that the Bristol mines should become as large a producer of iron ore as any of the ore bodies which I have examined either in the province of Quebec or Ontario. Should mining operations be carried on upon an extensive scale, the location offers some peculiar advantages, owing to the fact that four miles southeast of the mines the Ottawa river encounters a limestone ledge over which it falls in picturesque rapids and cascades about 40 feet. This water power, known as the Chats Rapids, could be utilized to advantage for producing power and compressing air, which might be carried as at Quinisee Falls and Michigammee River, Michigan, to operate machines at the mines, or by converting it into electric force, it may be conveyed so as to produce power. Inspection and analysis would indicate an ore obtainable for smelting purposes approximating 60 per cent. iron, 2 per cent. sulphur, with phosphorus very much below the Bessemer limit; and when roasted this ore should exceed 60 per cent. of iron, with sulphur below one per cent. Taking into consideration the facilities now existing in the city of Ottawa, it appears to be the most advantageous location for utilizing the ores from the Bristol mines. An examination of the vicinity of Ottawa developed four very satisfactory points where blast furnaces could be located to advantage, and where facilities are offered for adding other manufacturing industries in the future. Some of these points possess special merit as to certain features, but all are convenient to transportation, and have ample cinder room, water, etc.

On the line of the Rideau canal is the celebrated South Crosby ore deposit. Conveniently located along this waterway are also numerous deposits throughout the county of Lanark, as yet altogether undeveloped.

CENTRAL ONTARIO MINES.

The numerous and rich mines of the Renfrew district and Central Ontario, and along the lines of the Kingston and Pembroke, Ottawa, Arnprior and Parry Sound, and Irondale, Bancroft and Ottawa railways, would also be very accessible from this point. Bog iron ores for mixing might be obtained from Vaudreuil, the present source of supply of the Drummondville forges. They also occur (in unknown quantities, the deposits being undeveloped) in Templeton township; in Hull township, only a few miles north of the city of Ottawa; near the river in Eardly township, 20 miles to the west; at various places along the Rideau, and throughout Lanark and Renfrew counties. Iron deposits are known to exist also in the vicinity of Lake Nipissing, on Lake Temiscaming, and elsewhere in the county of Pontiac. By means of the opening of the waterway the distance from the iron regions of Lake Huron to Ottawa would be the same as to Cleveland.

The supply of ore which may be cheaply centered at Ottawa by the various waterways and railways is practically unlimited. A writer in the *Field Naturalist* several years ago asserted that—

"We have in the Hull, South Crosby, South Sherbrooke, McNab and Marmora deposits alone, in round numbers, 1,000,000,000 of tons, a quantity sufficient to yield 1,000 tons of ore a day for 3,000 years."

A statement so purely speculative must be taken for what it is worth. What is certain is, that deposits undeniably very large are already known, that the occurrence of iron is very general over a large part of the Laurentian area in the Ottawa Valley, and that the development work and exploration thus far

done amount to very little more than scratching the surface here and there.

Besides ore, however, there must be taken into account flux fuel, labor and transportation facilities. The city of Ottawa is built on limestone. On this point Mr. Birkenbine's report says :—

"Limestone is abundant in the territory about Ottawa, and the Geological Survey officers state that both limestone and dolomite, as well as intermediate qualities of magnesian limestone, are obtainable. It is therefore possible to find either near the mines or near the furnace location an abundance of limestone for flux."

Facilities for obtaining and cost of fuel are, perhaps, the two most important elements. To quote Mr. Birkenbine again :—

OTTAWA'S FUEL SUPPLY.

"To appreciate the position of Ottawa to a fuel supply, we may first consider its position in relation to the anthracite coal region of Pennsylvania. Taking Scranton as a centre, the circumference of a circle which passes through Ottawa, would also pass through or close to Cleveland, Ohio; London, Ont., and Rouse's Point, N.Y. As the railroad connections between Scranton and Ottawa are nearly direct, and as there is no duty on anthracite coal, this fuel should be delivered in Ottawa at approximately the same all-rail rates that prevail to the other points named. Very satisfactory coke for furnace use is now being produced in Pennsylvania, 100 miles nearer Ottawa than Connellsville, and the use of such fuel would give Ottawa an advantage of fully 100 miles over Chicago in distance."

Pennsylvania coal can be brought in by direct all-rail routes as stated, or via the Rideau canal. Nova Scotia coal comes as far as Montreal in considerable quantity, there entering into competition with American coal. It could be brought to Ottawa at very slightly increased cost. Within 8 or 10 miles of the city are extensive peat bogs, which might be successfully used for

coking purposes. Peat also occurs along the line of the Rideau canal, and in the vicinity of Caledonia Springs, close to the Ottawa river. And in case of the location of furnaces here it would be worth while to enquire into the value of refuse from the various sawmills, which now is allowed to pollute the river. This might be used as a fuel when converted into gas, as is at present practiced in Norway and Sweden in the manufacture of iron of the highest quality. The location is also one of the most favorable in Canada for the manufacture of charcoal iron, for from the forests of the great Laurentian area might be obtained supplies of charcoal for years to come. Labor is plentiful, cheap, and of good quality. With waterways south, east and west, and railways radiating in all directions, and located near the convergence of all the great trunk lines of Canada which have been or may be built. Ottawa would be in an ideal situation to distribute the manufactured product. To the eastern market she would be as near by water as Hamilton, and 250 miles nearer to Montreal. The Canadian Pacific and Ontario railroads running north to the Ottawa river, could be supplied to the best advantage. With cheap iron, cheap lumber, cheap waterpower, cheap electricity, and cheap transportation, manufactures would spring up in the Ottawa Valley, and would create markets. And clearly, all development of mineral and forest resources to the northward, as well as all settlement in that direction, will have the Ottawa river as their base of supplies in the future as in the past.

TRAFFIC OF THE GREAT LAKES.

In these days of deep-waterways conventions we hear much said of the enormous traffic of the great lakes. It is interesting to note that nearly 75 per cent. of that is composed of lumber and iron. In view of that fact and considering that these two products constitute our most abundant and valuable resources, residents of the Ottawa Valley may be permitted to question the

sweeping assertion that all Canadian routes to the seaboard are disqualified "because they run through a district that can furnish but very little freight in either direction." We have iron enough to supply the continent. Mr. W. C. Edwards, M.P., one of the most prominent lumbermen in Canada, referring to the extensive forest area, and commenting on the methods of Canadian lumbermen, recently expressed the opinion, from his seat in the House of Commons, that a very large output of lumber from this region might be continued indefinitely, if proper measures for forest conservation are adopted. Unless there is some material error as to the extent and nature of our resources, or as to the functions and effect of waterways in developing these, there appears to be ground for asserting that the opening of the navigation of the Ottawa river to the great lakes will accomplish more for the advancement of Eastern Canada than any public work in our history, not excepting the Canadian Pacific Railway. Its beneficial effects in aiding the settlement of the Northwest, as well as the northern districts of Ontario and Western Quebec, are beyond the scope of this paper.